

Chapter 10 Environmental Health

Only sections or other elements of Chapter 10 revised for the Final EIS are included here. These changed sections combined with the unchanged sections of Chapter 10 in the Draft EIS constitute Chapter 10 of the Final EIS. Please see the introduction to the “Changes Made in the Draft EIS in Response to Comments” section for a full explanation.

The following changed elements of Chapter 10 are presented on the indicated pages. All other elements of Chapter 10 remain unchanged from the Draft EIS. Please consult the Draft EIS for those elements.

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10.2.1 Impacts and Mitigation Common to All Treatment Facilities and Treatment Plant Alternatives

Construction Impacts Common to All Treatment Facilities

Environmental health risks during construction center around noise and the potential for encountering contaminated soils. These risks would be similar for all treatment facilities and typical for these types of structures. Individuals immediately adjacent to construction could be affected, but impacts would be localized, short-term, and temporary. Because potential risks would be minimized through construction plans and construction best management practices (BMPs), these impacts would not be expected to be significant to the general community. Impacts specific to each treatment plant site alternative are highlighted in this section where appropriate.

Construction Noise Impacts Common to All Treatment Facilities

Because impacts from noise during construction of the treatment facility would be short-term and temporary, they are not expected to be significant. During construction, there would be a temporary increase in sound levels in the immediate vicinity of the activity and along local haul routes due to the use of heavy equipment and the hauling of construction materials. Construction-related noise could be expected throughout the construction period but would vary in intensity over that period depending on the phase of construction and specific activities. The duration of major construction activities expected to occur for each of the components of the treatment system is as follows:

- Treatment Plant – 18 to 24 months
- River Discharge – 1 month
- Wetland Discharge – Basic Option, 2 to 4 weeks; Expanded Option, 6 to 8 weeks
- Upland Discharge – 4 months
- Conveyance – 2 to 4 months

It is expected that the greatest amount of noise would be produced during the earth moving and excavation phases of construction, when heavy equipment (dozers, backhoes, etc.) and heavy trucks would be used. Diesel-powered construction equipment typically makes more noise than gasoline-powered vehicles. The low frequency of diesel engines travels farther and can impact older homes with single-pane windows and less insulation.

Full-time dewatering at the treatment plant construction site may be required for a portion of the construction period (up to approximately four months). If dewatering is required, portable generators to power pumps could be used and would operate during nighttime hours.

The remainder of the construction period for the treatment plant would consist of building construction, paving, and landscaping. Noise sources during this period of construction would include worker vehicle engines; heavy trucks delivering construction materials; small equipment such as drills, saws, and hammers; and worker voices. Occupants of adjacent properties and motorists on adjacent roadways would unavoidably be exposed to construction noise.

Table 10-2 shows unmitigated maximum noise levels from commonly used construction equipment. At distances beyond 50 feet, these maximum noise levels would be reduced by 5 to 7 dBA for each doubling of the distance between the noise source and the receiver. For example, a hydraulic backhoe excavator of 7-cubic-yard capacity and 760 horsepower could generate noise levels of 79 to 85 dBA at a distance of 100 feet. The actual noise reduction would depend on effects of terrain and line-of-sight barriers such as berms, retaining walls, opaque fences, and buildings.

Table 10–2. Expected Construction Equipment and Maximum Noise Levels

Type of Equipment	Rating or Capacity	Engine Size (Horsepower)	Range of Maximum Sound Level at 50 feet (dBA)
Crawler tractor / dozer	101 to 250 hp	101 to 250	81 to 85
	251 to 700 hp	251 to 700	85 to 90
Front end loader	2-1/4 to 5 cu yd	116 to 299	82 to 86
	6 to 15 cu yd	300 to 750	86 to 90
Hydraulic backhoe excavator	1-1/2 to 3 cu yd	131 to 335	82 to 86
	3-1/4 to 7 cu yd	336 to 760	86 to 90
Grader	9 to 16 ft blade	60 to 350	79 to 86
Mobile crane	11 to 75 ton at 10 ft boom	121 to 240	82 to 85
Pile driver (impact)	not specified	not specified	101
Pile driver (sonic)	not specified	not specified	96
Portable air compressor	400 to 2000 cfm at 100 psi	126 to 600	82 to 89
Trucks	100 to 400 hp	100 to 400	81 to 87

Source: Bolt, Beranek, and Newman, Inc. (1981)

The construction noise impacts specific to each treatment plant site are as follows:

City-owned Site. Occupants of nearby residential properties to the north and west of the City-owned site and motorists on adjacent roadways (Entwistle Street) would unavoidably be exposed to construction noise. Businesses and residences located two to three blocks away from the project area could also be temporarily impacted by demolition and construction activities, engine noise, and backup alarms, but noise levels would gradually diminish with increasing distance from the construction activity.

Weckwerth Site. Truck traffic and site work during construction would result in temporary noise impacts to students and employees of Tolt Middle School, residents of the existing house, employees of the adjacent concrete fabrication company, and the fire station. The types of noise that would be experienced include noise from demolition and construction activities, engines, and backup alarms. Noise level reduction with distance could be greater, depending on the effects of terrain and line-of-sight barriers such as buildings.

Potential for Encountering Contaminated Soils during Construction

There is a low to moderate potential for encountering contaminated soils or river sediments during construction of treatment facilities. Contaminated soils and sediments are strictly regulated for both those handling such materials and the general public. Regulations would reduce the potential for exposure and release. (See the discussion under Mitigation Measures Common to All Treatment Facilities.)

Accidental Spills during Construction

No significant adverse impacts are anticipated as a result of construction-related spills and other emergencies. The risks of spills during construction of wastewater treatment facilities are similar to risks posed by other large construction projects. Spills of fuels, oils, lubricants, or other substances can occur during transport or on-site during construction. Construction plans would include spill containment provisions and response kits to prevent off-site transport of spilled materials, but construction workers could still potentially come in contact with a spilled fuel or hydraulic fluid. (See the discussion under Mitigation Measures Common to All Treatment Facilities.)

Operation Impacts Common to All Treatment Facilities

Because of the high quality of treated water being discharged from the treatment facility, the safety and redundancy features incorporated into the design of the proposed facilities and the use of standard safety procedures, impacts to environmental health related to the operation of the treatment facilities are not expected to be significant. The discussion below focuses on the potential for impacts related to discharge of treated water, accidental spills, stormwater runoff, emergency overflows, and noise.

Discharge of Treated Water during Operation of Treatment System

The potential human health risks associated with highly treated water being discharged to surface and groundwater are generally directly or indirectly related to three constituents of concern: (1) bacteria, viruses, and other pathogens; (2) metals and organic chemicals; and (3) nutrients. Technology-based effluent limits for municipal wastewater treatment plants must comply with Section 40 CFR Part 133 and WAC 173-221. These regulations set limits for the water quality parameters identified as concerns. See Chapter 6 for further description.

The Carnation treatment facility would be designed to meet all permit requirements developed for the protection of human health and the environment. These requirements would enable the

facility to comply with water quality standards in effect at the time of permit issuance. As described in Chapter 3, the membrane bioreactor (MBR) selected for the treatment plant is one of the best available technologies for treating municipal wastewater and removing the constituents of concern. It also provides the most flexibility to adjust to the regulations specific to each discharge alternative as well as to changing regulations. The MBR would produce water of high quality regardless of which discharge alternative was chosen.

As described in Chapter 3, the Carnation treatment facility would utilize ultraviolet (UV) light for disinfection to respond to concerns about bacteria and other pathogens. Permit requirements stipulate that the total bacteria organism count should not exceed the most probable number (MPN) of 2.2 per 100 milliliters (ml). This level meets the guidelines published by the National Water Research Institute and American Water Works Association Research Foundation in *Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse* (NWRI-00-03). The UV disinfection process would kill nearly all microorganisms remaining in the water after the MBR process.

Studies have been conducted to measure the effectiveness of various types of treatment processes in removing viruses. The MBR technology consistently achieves removal rates of 99.99 percent and meets and exceeds applicable water quality standards (Beverly et al., 2002). As a comparison, conventional secondary treatment processes with disinfection are 48 to 96 percent effective in removing viruses in influent wastewater.

As described in Chapter 6, low levels of metals and organic chemicals are already present in freshwater systems, including the Snoqualmie River (see also Appendix A). Metals and organic chemicals (such as polynuclear aromatic hydrocarbons or PAHs) may also be present in highly treated water at very low levels. People pursuing recreational activities in the Snoqualmie River may potentially be exposed to these low levels of chemicals. The short duration of contact, the low volume of highly treated water being discharged, and rapid dilution by native river water would further reduce exposure to negligible levels. The highly treated water would meet all applicable permit requirements. These requirements are based on established criteria for toxic substances that may degrade the receiving water both in terms of aquatic life, and for purposes of reducing risks to human health (WAC 173-201A and 173-221).

Currently, state and federal water quality standards and criteria do not consider endocrine disruptor chemicals (EDCs). MBR treatment would remove a large percentage of suspected EDCs. Despite treatment, some potential endocrine disruptors may pass through the treatment system and be discharged (Stahlschmidt-Allner et al., 1997; Ternes et al., 1999). Both national and international research is being conducted on this issue. King County will continue to monitor research results and incorporate findings into its wastewater management approach as appropriate. The MBR technology provides flexibility to address changes in regulations should standards be developed for EDCs. Refer to Chapter 6 for further discussion.

As discussed earlier in this chapter under Existing Wastewater Treatment and Associated Human Health Issues, the nutrient nitrate, when present at high levels in drinking water, can pose a risk to human health. The Washington State Department of Health developed a Maximum Contaminant Level (MCL) for nitrates to protect drinking water supplies. The MCL for nitrate is less than 10 milligrams per liter (mg/l), measured as nitrate-nitrogen (NO₃-N). The Carnation

treatment facility would treat wastewater to below the MCL for nitrate if discharge to uplands is selected.

Accidental Spills during Operation of Treatment Plant

The risk of a chemical spill during operation of the wastewater treatment plant would be minor with the safety measures incorporated into the design of the treatment plant and appropriate handling procedures. The greatest potential risk would be to treatment plant operators because none of the chemicals that would be used at the treatment facility would cause impacts beyond the immediate vicinity of a spill. Emergency spill response procedures would be in place at the facility, and employees would be trained to respond.

Operation of wastewater treatment facilities requires the use of various chemicals for disinfection, odor control, and other processes. Chemicals would be delivered by truck and stored on-site in bulk storage tanks. These chemicals can pose health risks to treatment plant staff as well as the general public if uncontrolled. The Uniform Fire Code (UFC) regulates storage and use of these chemicals to reduce the potential for spills as well as specifying procedures to respond to spills. The two basic types of classified chemicals of concern are: (1) water reactive and oxidizing materials, which are considered physical hazards; and (2) corrosives and irritants, which are considered health hazards. The following materials that are anticipated to be used at the Carnation wastewater treatment plant are water reactive, oxidizers, corrosives, or irritants and, as such, are considered potential environmental health hazards under the UFC:

- **Sodium hypochlorite** is a liquid commonly used as household bleach. It is a strong oxidizing agent and, like bleach, may cause burns to eyes, skin, and the respiratory and digestive tracts. Although nonflammable and noncombustible, sodium hypochlorite is corrosive. Sodium hypochlorite is commonly used in treatment processes for backup odor control and membrane cleaning.
- **Aluminum sulfate** is commonly used for backup phosphorous removal and as a coagulant for clarification of water. It is a strong oxidizing agent, may be harmful if inhaled, and is an irritant to the eyes and skin. The substance is stable under normal conditions and is not flammable.
- **Caustic soda** (sodium hydroxide) is commonly used for backup alkalinity control. Although nonflammable and noncombustible, it can cause severe burns to eyes, skin, and the respiratory and digestive tracts.
- **Citric acid** is commonly used for membrane cleaning. Although it has low flammability and is noncombustible, it may cause irritation to eyes, skin, and the respiratory tract.

All chemical storage and handling would be designed to comply with the applicable local, state, and federal regulations. See the section in this chapter titled Mitigation Measures Common to All Treatment Facilities for a description of measures to prevent accidental spills.

Stormwater Runoff during Operation of Treatment Plant

Stormwater from areas of the treatment plant where there is a risk of chemical or solids leaks or spills, such as loading areas, would be collected and segregated and then routed to the treatment plant. This would cause any leaks or spills in these areas to be contained and treated and not discharged untreated to adjacent surface waters. Stormwater generated at parking lots and other general areas of the treatment plant site where no wastewater, solids, or chemicals are handled would be routed to biofiltration swales for treatment, and then infiltrated into the ground or directed to natural surface waters.

Potential for Emergency Overflows during Treatment System Operation

In the very unlikely event of severe system failures, there is a potential for emergency overflow of partially treated wastewater to occur, which could result in risks to public health. State and federal guidelines require that storage basins (for the wetland and upland discharge alternatives only) and full standby power systems be provided to comply with reliability criteria. System redundancy features such as backup pumps would also be included. These measures would greatly minimize the potential for release of partially treated wastewater from the treatment plant. See the section on basic treatment plant configuration in Chapter 3 for additional discussion of backup systems to prevent/minimize the potential for emergency overflows.

If such a release were to occur, partially treated wastewater would be discharged to the plant's stormwater system, with the potential to eventually drain to local watercourses. Short-term human health impacts could result if partially treated water were to be discharged from the treatment plant site to public areas. The effects of emergency overflows on human health would depend on the proximity to human populations that come in contact with the partially treated wastewater. Contact with bacteria, viruses, or protozoa present in the partially treated wastewater could result in illness.

For the upland and wetland discharge alternatives, the facility would provide 24-hour emergency storage to prevent partially treated water from leaving the facility, as mandated by state regulations. For the river discharge alternative the 24-hour emergency storage is not mandated by regulations; however, with the backup systems designed into the proposed facility, risks would still be minimal.

With the measures that would be required as part of permitting for the project, the risks associated with an emergency overflow would be minimized. The mitigation measures discussed under Mitigation Measures Common to All Treatment Facilities would further reduce these potential impacts.

Noise Impacts during Operation of Treatment Facilities

The following types of noise are typically associated with treatment facility operation:

- Noise from the operation of mechanical equipment, including pumps, blowers, fans, mixers, and generators

- Noise from standby electrical generation equipment (e.g., backup generators for treatment facilities during a power outage)
- Noise from truck traffic, including deliveries and the transport of solids, grit, or screenings

No significant noise impacts from facility operations are anticipated. Equipment that generates substantial levels of noise at the treatment plant could be enclosed or shrouded in sound-attenuation structures. At posted speed limits, impacts from truck traffic noise are expected to be minimal due to the low number of trucks using the facility.

Discussion of operational noise specific to each treatment plant site is provided below.

City-owned Site. The closest noise-sensitive receptors to the City-owned site are residences and visitors to Tolt MacDonald Park. The treatment plant would be considered an industrial noise source. The noise generated by plant operations that would be heard at these closest receptors would not exceed City of Carnation nighttime standards of 50 dBA for an industrial source generating noise in a residential area (see Table 10-1).

Weckwerth Site. The nearest noise sensitive receptor to the Weckwerth site, Tolt Middle School, is located north of the site. Noise generated by the treatment plant (an industrial noise source) as experienced at the school would not exceed levels allowed by the City of Carnation for a residential area during the daytime (60 dBA).

10.2.1.1 Mitigation Measures Common to All Treatment Facilities

Construction Mitigation Measures Common to All Treatment Facilities

Measures to Minimize Construction Noise Common to all Treatment Facilities

The following mitigation measures could be used to minimize noise impacts as a result of construction:

- Conduct construction activities during weekdays between permitted construction hours (City of Carnation – 7 a.m. to 7 p.m., King County – 7 a.m. to 10 p.m.). Any construction activities occurring outside of exempt daytime hours would require a variance, and the public would be notified as needed.
- Use modern construction equipment, including vehicles and machinery, throughout the duration of construction.
- Where practicable, muffle noisy portable equipment such as generators and locate such equipment as far away from sensitive receptors as practical. Operation of the generator used for construction dewatering (if needed) would be required to meet allowable noise levels in the City's noise ordinance.

- Maintain muffler systems on heavy construction equipment in good working order to ensure maximum noise attenuation.
- Use noise barriers or other measures to minimize noise impacts on sensitive receptors.
- Install double-pane windows in buildings potentially affected by construction noise.
- Locate construction haul routes to minimize impacts on sensitive receptors as appropriate.
- At the Weckwerth site, seek a construction access easement farther away from the school than the current site access.
- Establish a 24-hour hotline for the public to express complaints about noise impacts. Send flyers to the community well in advance of construction to inform them about the project.

Measures to Address Contaminated Soils and Accidental Spills during Construction Common to All Treatment Facilities

The following measures could be used to minimize risks associated with encountering contaminated soils and with handling chemicals during construction:

- Comply with hazardous waste regulations (Model Toxics Control Act [MTCA] rules per Chapter 173-340 WAC) and standard procedures to determine the nature and extent of contamination. This could include conducting environmental site assessments and hazardous material surveys prior to right-of-way acquisition or construction of the conveyance pipeline.
- Prepare a hazardous substance management plan to specify procedures, including identification, storage, and disposal, for work in areas where contaminated soil could be encountered. Compliance with MTCA would reduce the potential for exposure to contaminated soils and would require approved disposal.
- Conduct site work in compliance with OSHA/WISHA standards for the protection of worker health.
- Develop a Spill Prevention, Containment, and Control Plan (SPCCP) prior to construction. Observe all applicable safety and environmental regulations for handling chemicals and responding to emergencies as described in the plan. Maintain spill containment and cleanup materials at the construction site.
- Design all chemical storage and handling facilities to comply with the applicable local, state, and federal regulations, such as UFC regulations for tank leakage, spill control, and secondary containment (Section 8003.1.3 UFC); the Resource Conservation and Recovery Act (RCRA); and Occupational Safety and Health Administration (OSHA) requirements.

Operation Mitigation Measures Common to All Treatment Facilities

Measures to Minimize Health Risks from Discharge of Treated Water Common to All Treatment Facilities

The MBR selected for the treatment plant is one of the best available technologies for treating municipal wastewater. Wastewater would be treated to meet or exceed all applicable water quality standards and to comply with Ecology's NPDES requirements. These standards and requirements are designed to protect human health and the environment.

Water quality monitoring and reporting would be conducted in order to verify that discharge of highly treated water meets or exceeds all water quality standards. This monitoring would occur prior to discharge and in the environment receiving the discharge.

Measures to Minimize Accidental Leaks and Spills during Operation Common to All Treatment Facilities

The following measures could be used to minimize the risk of and respond to accidental leaks or spills during operation of the treatment facility:

- Incorporate measures including spill containment provisions, double-walled storage facilities, and emergency cleanup procedures into the design of the facility.
- Design all chemical storage and handling facilities to comply with the applicable local, state, and federal regulations, such as UFC regulations for tank leakage, spill control, and secondary containment; RCRA; and OSHA. The UFC includes requirements for appropriately sized, liquid-tight floor containment (secondary containment) and special sumps and collection systems. Secondary containment would consist of a separate containment area around each of the chemicals stored at the facility with a minimum capacity equal to the maximum volume stored in the tank. Drip sumps that drained to the containment area would be placed below the fill ports for each tank. Any drainage from the containment areas would be routed to the treatment plant for treatment. Other safety features would include leak detection systems, alarms, overfill protection, clear labeling, splash guards, eyewash and shower, and cabinets for goggles and other personal protection equipment.
- Design treatment facilities to include measures that minimize the risk of fire or explosion. Examples include fire sprinklers, an alarm system and maximum use of non-combustible building materials.
- During operation, clean and inspect chemical and process treatment tanks, piping, and equipment on a routine basis to prevent spills and leaks.
- Develop spill prevention and response plans to prepare for and handle leaks or spills of chemicals. At a minimum, plans would meet the requirements of both the UFC, which requires a Hazardous Material Management Plan, and the Clean Water Act regulations

(40 CFR 112), which require a Spill Prevention, Containment, and Control Plan for storage of petroleum products.

- Develop emergency response programs in cooperation with the local fire district and emergency service providers. If a spill or leak occurs, notify appropriate agencies and isolate the spill area.
- Ensure that treatment facility operators are trained in chemical handling protocols and the use of personal safety equipment.
- Comply with all U.S. Department of Transportation safety requirements for transportation of the chemicals used at the treatment facility, including use of double-walled tanker trucks.
- Design force mains to withstand operating and transient pressures in accordance with American Water Works Association design criteria and Ecology's *Criteria for Sewage Works Design* (Ecology, 1998).
- Minimize potential for escape of chemicals or wastewater in the event of flooding by designing chemical storage tanks to be sealed and treatment tanks to be tall enough that they won't be overtopped by 100-year flood.
- Contain potential airborne contaminants by cleaning and covering areas that could release contaminants and meeting air quality standards for site emissions.
- Design the stormwater collection system within the treatment plant facility to separate runoff from process areas (such as loading and biosolids handling areas) from non-process areas (such as rooftops and parking lots). Slope process areas so that they direct stormwater from these areas to the treatment plant for treatment.
- Develop security and emergency response measures and protocols for the treatment plant to protect against unauthorized entry. These measures could include restricted access, fencing, controlled visitor access, and security cameras.

Measures to Minimize Risks of Emergency Overflows Common to All Treatment Facilities

To prevent overflows, the treatment plant would be designed to meet the reliability and redundancy standards required by federal and state regulations for the plant operation as well as the selected discharge alternative. These measures include:

- Installation of full standby power systems in accordance with federal and state reliability criteria. These standards require that in the event a power source has a mechanical failure, its standby or backup unit would automatically be placed in operation. A backup electrical power source (diesel generator) and associated equipment would be provided to reduce the potential for overflows. The generator would be designed to automatically start upon a power failure.

- Installation of backup screens, pumps, sedimentation basins, aerators, air diffusers, and disinfectant contact basins to minimize the potential for equipment failure.
- For the upland and wetland discharge alternatives, the facility must provide 24-hour storage basins to handle emergency and maintenance events in order to prevent any partially treated water from leaving the facility (Carollo, 2003b).
- The Wastewater Treatment Division has a dedicated staff that regularly maintains and tests all of the equipment in its system, including emergency generators. In addition, members of the Division staff are on call 24-hours per day to correct any problems that may occur.
- Response to emergency incidents such as power outages and earthquakes would be in accordance with the King County Emergency Management Plan. The plan identifies roles and responsibilities related to restoring and continuing public works functions, including wastewater treatment, in the event of such emergencies. Procedures specific to the Carnation treatment system would include annual training for treatment plant operators, isolating facilities from public access, signage, monitoring of receiving waters to ensure public health and safety, and other emergency procedures.

In the unlikely event that there was a severe multiple-system failure and an emergency overflow occurred, several measures would be implemented:

- The Seattle-King County Department of Public Health (SKCDPH) would install temporary warning signs or provide other methods of notification in affected areas.
- Appropriate cleanup measures would be initiated and water quality monitoring would be conducted until conditions returned to background levels.
- Ecology would be notified within 24 hours of an emergency overflow.

Measures to Minimize Noise during Operation Common to All Treatment Facilities

The following mitigation measures could be used to minimize noise impacts during the operation of the wastewater treatment facilities:

- Maintain facility vehicles and trucks used to transport solids in good working order.
- Locate noisy equipment inside buildings and use noise-attenuating features such as sound insulation (e.g., sound absorption panels) on equipment and walls; sound-attenuating louvers; isolation of noise-producing equipment in separate rooms; and/or provision of sound-insulating enclosures over noise-producing equipment.
- Design buildings so that large-mass components are positioned to dampen noise.
- Design doors (especially near noisy equipment such as the generator) so that they minimize noise transmission when closed.

- Orient openings such as louvers and doors away from sensitive receptors (e.g., school).
- Locate outdoor equipment such as transformers in such a way that building structures will act as barriers to shield noise associated with equipment.
- Locate treatment plant as far from sensitive receptors as practicable.
- Place vibration mounts on high-vibrating equipment along with over-vibration cut-out controls.
- Schedule emergency generator testing to minimize noise impacts to surrounding properties.
- Maintain sound-attenuating structures and features in good working condition.
- Incorporate structural features and/or landscaping in the design of the facility to minimize noise impacts of day-to-day operations, especially on sensitive receptors.